Limited One- Year Warranty

This Limited One-Year Warranty is given to the original purchaser (the "Buyer") of this new Summit or Summit Performance Branded Product. Summit Racing Equipment warrants that the product will be free from defects in workmanship and materials under normal use and service for one year from the date of purchase.

Your responsibilities:

Keep a sales receipt, canceled check, or payment record to verify your purchase date. Operate and maintain the product in accordance with the specifications provided to you with the product. Arrange for or pay items and costs that are not covered by this Limited Warranty.

What is not covered:

1. Damages caused by shipping, product misuse, misapplication, improper installation or maintenance, or damages resulting from accidents, contact with on-road or off-road hazards, or racing engine use.
2. Labor costs to remove and install the products or component parts.
3. The costs of shipping the product to and from Summit Racing Equipment.

Claims Procedure:

The duration of this warranty is limited to claims made in writing to Summit Racing Equipment within one year after the Purchase Date. The Buyer should call the telephone number below to report a possible warranty claim. The Buyer must also allow Summit Racing Equipment to inspect the product, and the Buyer must reasonably cooperate with Summit Racing Equipment with respect to verifying the warranty claim of the Buyer. In the event that a warranted defect is discovered, Summit Racing Equipment will repair or replace the product, or return the purchase price to the Buyer, at the option of Summit Racing Equipment.

All shipping costs are paid by the Buyer. Merchandise returned to Summit Racing Equipment without prior authorization will not be accepted.

This warranty extends only to the Buyer and is not transferable.

Implied warranties applicable to this transaction extend only to one year. Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

Summit Racing Equipment shall not be responsible for any incidental or consequential damages of the Buyer. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation may not apply to you.

This warranty gives you very specific legal rights, and you may also have other rights which vary from state to state.

SUMMIT RACING EQUIPMENT

1-800-230-3030 • SummitRacing.com®

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SUMMIT RACING EQUIPMENT

Summit Cam Degreeing Kit
SUM-G1056-16/SUM-G1057-16

Thank you for purchasing this Summit Cam Degreeing Kit. In addition to checking camshaft timing and piston to valve clearance, you will find many other uses for the indicator and magnetic base: checking flywheel runout, crankshaft endplay, and ring gear backlash are just a few examples. If you are someone who likes to save money by doing things yourself, this kit will pay for itself many times over.

Learning to use the kit correctly will help to take some of the mystery out of valvetrain operating, so please read all instructions first. Make sure to check the contents of your kit. If you have any questions, please call our tech line at (330) 630-3030.

Parts List

- 2 low tension checking springs
- 1 wire pointer
- 1 TDS stop (head on engine type)
- 1 11" degree wheel
- 3 adapter bushings
- 1 flat washer
- 1 magnetic base
- 1 dial indicator
- 1 carrying case

Why Should I Degree My Camshaft?

Valve opening and closing points are what give an engine a specific performance curve. Degreeing a cam is the only way of finding out where your valves are opening and closing in relation to the crankshaft position. By degreeing the cam, you will be able to detect and compensate for errors in valve timing. These errors can be due to variations in the machining of the timing set, the crank keyway position, or the cam itself.

Getting Started

There are two basic methods of degreeing camshafts. One locates the theoretical centerline of the #1 intake lobe. The other locates the opening and closing points of the #1 intake valve (or lifter) at a specified amount of lift — usually .050". We are going to use a combination of both and adjust the intake centerline (if needed) to make sure the opening and closing points are where they should be.

Most modern cam lobes are asymmetrical by design, so relying on theoretical centerline position alone is not good enough. Relying on centerline alone will also miss a lobe that is either too big or too small. In other words, centerline tells you nothing about any variation of the opening and closing ramps of the lobe. Depending on the amount of variation, you can either split the difference or set either the intake opening or closing point as it specified position. Keep in mind the point at which the intake valve closes has an obvious effect on cylinder pressure.

The table below describes the basic effects of advancing or retarding a camshaft.

General Effects of Advancing or Retarding a Camshaft

	Performance	Piston to Valve Clearance	Valve Timing
Advancing the Cam	Shift Power Curve down approximately 200 rpm for a 4 degree change	Intake Valve loses Exhaust Valve gains	All timing events occur sooner
Retarding the Cam	Shifts Power Curve up approximately 200 rpm for a 4 degree change	Intake Valve gains Exhaust Valve loses	All timing events occur later
Note: The 200 RPM shift in the power curve is an approximate figure for most high performance street/strip engines.			

Questions? Call our Tech Line 1-330-630-3030

Basic Degreeing Procedure (with heads on engine)

Note: References to clockwise and counterclosewise are based on a person facing the front of the engine.

1. Install the checking springs on the #1 cylinder. If you don't wish to remove the existing valve springs, you can degree the cam directly off a solid lifter. Make sure the specs on the cam card are taken from the lifter also. If they are taken at the valve, divide the valve lift by the specified rocker ratio to get the correct tappet lift. Since we have included the checking springs, the rest of the instructions will refer to degreeing the cam from the valve.

2. Install the new cam and adjustable timing set per manufacturers instructions. Make sure both lobes for the #1 cylinder are free of any thick assembly lube that may throw off your readings. After the degreeing procedure relubricate the lobes.

3. Install the degree wheel on the front of the crankshaft using your balancer bolt and the aluminum bushings. Attach the pointer at a convenient location, usually a bolt near the water pump. Align the pointer so that it is aimed directly at the center of the wheel and the tip is close to the edge of the wheel.

4. Bring the #1 piston close to Top Dead Center (TDC) on the compression stroke (both valves closed). Without moving the crank, adjust the degree wheel so the pointer is at the TDC mark on the wheel. This is just to get you close to position.

5. Turn the crankshaft 1/4-turn counterclockwise to lower the piston, then install the piston stop in the #1 spark plug hole. Screw the center post on the stop all the way in. Gently turn the crank clockwise until the piston hits the stop and record the reading. Turn the crankshaft in the opposite direction until the piston comes back up and hits the stop, then record that reading.

6. If your original TDC estimation was correct, you'll have an equal amount of travel on either side of TDC (34 degrees BTDC and 34 degrees ATDC, for example). In most cases you'll have unequal readings, such as 38 degrees BTDC and 30 degrees ATDC. In this case, just split the difference and adjust the degree wheel without moving the crank. Here is an example:

   $$38 \text{ degrees} - 30 \text{ degrees} = \frac{8 \text{ degrees}}{2} = 4 \text{ degrees}$$

7. Be sure the check the accuracy of your adjustment by turning the degree wheel from stop to stop again. You should have an equal amount of travel on each side of TDC.

8. Place a solid lifter of the type that matches your cam on the #1 intake lobe. Install the appropriate pushrod and rocker on the same valve. If an adjustable pushrod is available, use it; you can make it longer to compensate for the shorter mechanical lifter and keep the geometry the same.

9. Place the dial indicator and magnetic base on the cylinder head. If you have aluminum cylinder heads, you'll need to mount a flat piece of steel to the valve cover mounting holes for the magnetic base to attach to. Preload the dial indicator a little more than your maximum valve lift, and be sure the probe on the dial indicator is resting on the valve spring retainer and in alignment with the travel of the valve. This will reduce any geometric error in the valve lift measurements.

10. Rotate the engine clockwise until you reach the point of maximum lift. Start slowing down as the needle slows down. When the needle stops moving you have reached the point of maximum lift. Double check the indicator probe to see if it is still touching the valve spring retainer. If you didn't preload the indicator enough, the probe will be resting in the air. That will stop the movement of the needle, but the cam won't be at max lift.

11. If everything is OK, turn the face of the dial indicator to zero. Turn the crank until you reach .050" before max lift and mark the position on the wheel. Continue turning the crank until the needle indicates .050" after max lift and record the reading. Add the two readings together and divide by two. For example:

    150 degrees on one side
    + 66 degrees on the other = 216 degrees

    $$\frac{216}{2} = 108 \text{ degrees}$$

12. This result (108 degrees in our example) will be the point of maximum lift, which is the theoretical intake centerline. If you're within one degree of the specification on the cam card, you're all set. If you are further off than that, you must adjust the cam's position and repeat the degreeing procedure. If you got a smaller number, the cam is advanced and would need to be retarded. Say in our example the cam came out at 106 degrees instead of 108. That means it is advanced and you would need to retard it two degrees. Getting a larger number than what is on the cam card means that the cam is retarded. In our example, getting 110 degree reading for a cam speced at 108 indicates the cam is two degrees retarded, so you would have to advance it two degrees.

13. Once the intake centerline is correct, check the opening and closing points of the #1 intake valve at .050" lift. Preload the indicator as before and turn the crank in the same direction until the valve closes. The needle will stop moving since it will be on the heel of the lobe. Set the indicator face to zero, then slowly turn the crank until the needle just starts to rise as the valve opens. Turn very slowly until the needle reads .050" of valve lift. Record the reading on the degree wheel, then turn the crank and count the revolutions of the needle from .050" open until the valve reaches maximum lift. At that point the needle will momentarily stop, then change direction.

14. Continue turning the crank as the valve closes and the needle makes the same number of turns until the valve is a .050" before being fully closed. Record the reading on the degree wheel, then compare both readings to the specifications on the cam card. Again, if they are within one degree they are fine. If not, the cam position will need to be adjusted. Follow your timing set instructions on making any adjustment. Recheck after you're done.

Note: When checking opening and closing points, look at the cam card to see if the .050" lift is measured at the lifter or the valve. If it is measured at the lifter, you need to multiply the lift figure by your rocker ratio since you are measuring at the valve.

15. Set up the indicator, lifter, and proper pushrod on the exhaust lobe of the #1 cylinder for a quick check of maximum lift, lobe center, and opening and closing points.

16. Now that the cam is correctly positioned, remove your checking equipment and recoat the #1 lobes and lifters which your cam maker's recommended break-in lube. Replace the checking springs with the originals and assemble the remainder of the engine. Pay close attention to getting the engine ready to start immediately after the key is turned. Put a timing light on the #1 plug wire and have the fuel system primed and ready to flow. Quick startup and proper cam break-in is essential. Make sure to follow all of your cam maker's break-in instructions to get the maximum performance life possible out of your camshaft.